

## Clinical and Functional Outcome Following Distal Tibial Fracture Treated by Circular External Fixation

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**Purpose:** Distal tibial fractures are notoriously difficult to treat and a lack of consensus remains on the best approach. This study examined clinical and functional outcomes in patients with fractures extending within 1 Muller square of the ankle treated definitively by Ilizarov fixation.

**Methods:** Between July 2011 and 2016, patients with distal tibial fractures were identified from our Ilizarov database. Fractures were classified according to the AO/OTA classification. Functional outcome data, including general measures of health-related quality of life and limb-specific scores had been routinely collected for part of the study period. Patients in whom these data had not been collected were asked to complete these by mail. Adverse events were documented according to Paley's classification of: problems, obstacles, and complications. Data did not meet the assumptions for parametric analysis and therefore nonparametric methods were used.

**Results:** 168 patients with 169 fractures were identified, 47 (28%) were open and 107 (63%) intra-articular. 164 (97%) of the fractures united (4 nonunions, 1 amputation in a diabetic patient with an insensate limb due to peripheral neuropathy), at a median of 166.5 days (range, 104-to 537; interquartile range [IQR], 138 to 203). 3 nonunions united with further treatment, 2 by Ilizarov frame and 1 by internal fixation. The final nonunion appears to be uniting in a second frame. Closed fractures united more rapidly than open (median 157 vs 183 days;  $P = 0.005$ ) and true Pilon (43C3) fractures took longer to unite other fractures (median 157 vs 177 days;  $P = 0.01$ ). 36% of patients encountered a problem, 11% an obstacle, and 9% a complication. Of the complications, 6 (4%) were minor, 5 (3%) major not interfering with the goals of treatment, and 5 (3%) major interfering with treatment goals. Functional outcome data were incomplete; 62% of patients overall had completed an outcome form. Overall 56% reported good or excellent ankle scores at last report, 28% fair and 16% poor. Closed, extra-articular, and non-43C3 fractures had better functional outcome scores than open, intra-articular, and 43C3 fractures, respectively. We hope to improve the completeness of this dataset. General measures of health-related quality of life revealed that these injuries continued to significantly affect patients despite good clinical outcomes.

**Conclusion:** This study demonstrates a high union and low serious complication rate, suggesting that external ring fixation is a safe and effective treatment for these injuries.